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PHYSIOGRAPHIC NOTES.

BY

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THE LANSING MAN.—There has been much written recently about the discovery of human bones at Lansing, Kansas, and there have been some rather startling conclusions drawn concerning the age of these remains, Warren Upham, for example, having placed their age at 12,000 years (*American Geologist*, September, 1902, Vol. XXX, page 147). The question of the antiquity of these bones is one that requires careful study of the nature and origin of the deposit in which they are enclosed. This study has been undertaken by Professor Chamberlin in company with a number of other students of physiography and anthropology. The results of this study are presented in a recent paper by Professor Chamberlin (*Journal of Geology*, Vol. X, 1902, 745–779).

Professor Chamberlin's paper first considers certain features of river action, which he includes under the heading *Scour and Fill*, in which he points out that even in a single season the bed of a stream may be changed in depth several times. He points out that the Missouri River in this spot has recently changed its course about eight years ago, having been very near the deposit in which the bones were found. An instructive diagram illustrates this section, taken from Todd's *Bulletin United States Geological Survey*, No. 158, regarding which Chamberlin says:

> An inspection of this will show that a skeleton might have been deposited on the surface of the carboniferous rock-bottom, much as in the case of the skeleton at Lansing, on the 28th of July, 1883, and have been buried in alluvium as deeply as the Lansing skeleton by August 18th, only twenty-one days later. Without doubt within a few years it would be covered by sixty feet of alluvium through the migration of the channel of the river.

A further consideration of the nature of stream deposits follows, as a result of which it is clearly shown that, by a number of causes commonly known to be connected with river work, it would be possible to bury an object to a depth and in a position similar to that of the Lansing remains. The occurrence of these bones is then considered in detail, with photographic and other illustrations, from which one gets a very clear idea of their mode of occurrence. From his studies Chamberlin draws certain conclusions of importance, the first of which is that the deposit is not in true original loess, but "in a mixture of loess-like silt, carboniferous detritus, water-laid clay and other debris." The bluffs near the deposit clearly show recent work of the river in the form of slides on their faces. Chamberlin concludes his article by a statement of what he calls *The Most Conservative and Most Probable View*, followed by five hypotheses, which he includes under the heading, *Possible but not Probable Interpretations.* The article is followed by notes from Professors Calvin and Salisbury, in which they state agreement with *the most conservative and most probable view.*

This *most conservative and most probable view* is that the human remains were buried beneath deposits brought by the streams, and were not connected in any way with the original deposit of the loess. In his statement of this view Chamberlin gives details as to how the worked-over material could have been accumulated, and concludes by the following statement:

> Under this view the burial of human remains took place either during the latest phases of the erosive process of the stage indicated or in the early phase of the building of the flood-plain. The antiquity of the burial is measured by the time occupied by the Missouri River in lowering its bottoms, two miles or more in width, somewhere from fifteen to twenty-five feet—a very respectable antiquity, but much short of the close of the glacial invasion.

GLACIATION OF THE ERIE AND OHIO BASINS.—An exceedingly valuable monograph has recently appeared from Leverett's pen (Monograph XLI, United States Geological Survey, 1902) under the title of Glacial Formations and Drainage Features of the Erie and Ohio Basins. It is a type of the sort of glacial geology work of which there is now a decided need—namely, a careful study of restricted areas. It is quite impossible to summarize so large a monograph here, though certain points brought out are of sufficient general importance to note. Leverett states that modification by glacial erosion in the vicinity of the glacial boundary is surprisingly slight—in fact, that neither a study by map nor in the field will make the extension of glaciation clear.

A great deal of space is devoted to a consideration of changes in drainage as the result of the glaciation of the district studied. On pages 196–200 is a brief consideration of the causes for changes in drainage. In this he points out the importance of glaciation, and especially of the effects of various advances of the ice. Under the consideration of changes of drainage Leverett takes up the question of the Genesee, reaching essentially the same conclusion which

Whitbeck reached (BULLETIN, American Geographical Society, February, 1902).

The drift border of the glacial boundary in the western portion is found to be not a single deposit. It is formed in part by the border of the Wisconsin drift, in part by the Illinoisan drift, and in part by a sheet that appears to be still older than the Illinoisan, probably belonging to the Kansan or pre-Kansan. There is evidence of periods of deglaciation, as, for example, the Sangamon soil and weathered zone, in which a black soil is found, accompanied by the decay of the pebbles and leaching of the till, the lime having usually been removed to a depth of several feet, accompanied by a nearly complete solution of the limestone pebbles. This weathered zone appeared on the drift of the Illinoisan stage. Another similar zone of soil and weathering, called the Peorian, occurred after the Iowan stage.

Much space is given to a statement of the evidence of the older drift which is found in the western portion of the district studied. The oldest Kansan and pre-Kansan drift contains pieces of red granite that have become so decayed that a single blow of the hammer will break them to pieces. It is a thin deposit on the upland, where it is usually greatly weathered from top to bottom; and in the valley deposit weathering is very pronounced for 20 feet or more. Striated stones are found in the upland drift, though the striæ are rather indistinct because of the weathering. Evidence of the great age of this drift is also supplied by erosion; it is held that the narrow strips found in protected places on the valley borders represent a former filling to that elevation.

There is also a brief chapter on loess, concerning the origin of which Leverett says:

> It is generally recognized that difficulties attend the application of any one hypothesis to the entire deposit. Probably no one questions the view that the influence of the wind has been important, and nearly all will concede that water, or, at least, imperfect drainage, has been influential. The division of opinion, therefore, is concerned with the relative importance of wind and water in the distribution of the loess.

More than half the monograph is devoted to a consideration of the episodes connected with the Wisconsin stage of glaciation, including a description of the various moraines, wash deposits, striæ, and lake stages. In this monograph is included the most complete treatment so far presented of the complex history of that part of the Great Lake region which is covered by the monograph—namely, the basins of Erie and southern Ontario. The report is freely illustrated, and contains a full bibliography. It is of great interest and importance to students of glacial geology and physiography, and may be counted as one of the most important monographs so far published on the glacial geology of North America.

ROCK BASINS.—In the *Bulletin* of the Geological Society of America (Vol. XIII, 1902, 293–304) Coleman gives a description of an interesting rock basin at Helen Mine, at Michipicoten, Canada. He says that most of the rock basins of Canada are due to the removal by glaciers of preglacially-decayed materials, thus revealing irregularities in the rock surface. He does not seem to consider the glacial erosion as competent by itself to form rock basins. In this he is certainly incorrect, for there have been numerous cases of rock basins described in which glacial erosion is the only explanation. In the case of the rock basin under consideration, Coleman shows quite conclusively that the basin has been caused by preglacial decay on an outcrop of iron ore. It is an interesting addition to the series of basins of irregular rock decay already known to exist.